

# Work Order ID 85990

**\*85990\***

Page 1

June-19-12 1:17:06 PM

Item ID: D212-664-201TRN

Accept

**\*N900040100\***

Setup Start

**\*NS1\***

Revision ID:

Item Name: Crosstube Turning Detail

Stop

**\*NS2\***

Start Date: 19/06/2012 Start Qty: 1.00

**\*1\***

Cust Item ID:

Required Date: 03/07/2012 Req'd Qty: 1.00

**\*1\***

Customer:

Reference:

Approvals: Process Plan: ML5

Date: 12/06/19

Tooling:

Date:

Run Start

**\*NR1\***

QC:

Date:

SPC (Y/N):

Date:

Stop

**\*NR2\***

| Sequence ID/<br>Work Center ID | Operation<br>Description | Set Up/<br>Run Hours | Tool ID | Tool # | Plan<br>Code | Accept<br>Qty | Reject<br>Qty | Reject<br>Number | Insp.<br>Stamp |
|--------------------------------|--------------------------|----------------------|---------|--------|--------------|---------------|---------------|------------------|----------------|
|--------------------------------|--------------------------|----------------------|---------|--------|--------------|---------------|---------------|------------------|----------------|

Draw Nbr

Revision Nbr

D212-664-241

Rev D

100

0.00

**\*100\***

Mori Seiki

MORI SEIKI CNC LATHE LARGE

Memo

0.00

Mori Seiki CNC Lathe Large

1-Fill tube with sand & install plugs DT8534 on both ends as per Folio FA114

2-Turn first side as per Folio FA114

3-Blend transition lines only, \*\*do not sand whole tube\*\*:

FOLIO REV: AD

DWG REV: D

\*Use mill bastard file, brush file repeatedly with file card.

\*Do not use sandpaper coarser than 320 grit.

1 0

mm.l  
12/08/12

110

QC1- Inspect dimensions to dimension sheet

0.00

**\*110\***

QC

Memo

0.00

Quality Control

1 0

mm.l  
12/08/12



**Work Order ID 85990**

June-19-12 1:17:06 PM

**\*85990\***

Page 2

Item ID: D212-664-201TRN

Accept

**\*N900040100\***Setup Start **\*NS1\***

Revision ID:

Stop **\*NS2\***

Item Name: Crosstube Turning Detail

Start Date: 19/06/2012 Start Qty: 1.00

**\*1\***

Cust Item ID:

Required Date: 03/07/2012 Req'd Qty: 1.00

**\*1\***

Customer:

Reference:

Approvals: Process Plan: Date: Tooling: Date:  
QC: Date: SPC (Y/N): Date:

Run Start **\*NR1\***Stop **\*NR2\***

| Sequence ID/<br>Work Center ID | Operation<br>Description | Set Up/<br>Run Hours | Tool ID | Tool # | Plan<br>Code | Accept<br>Qty | Reject<br>Qty | Reject<br>Number | Insp.<br>Stamp |
|--------------------------------|--------------------------|----------------------|---------|--------|--------------|---------------|---------------|------------------|----------------|
|--------------------------------|--------------------------|----------------------|---------|--------|--------------|---------------|---------------|------------------|----------------|

120

0.00

**\*120\***

MORI SEIKI CNC LATHE LARGE

Mori Seiki

Memo

0.00

Mori Seiki CNC Lathe Large

1-Turn second side as per Folio FA114

2-Blend transition lines only, \*\*do not sand whole tube\*\*:

\*Use mill bastard file, brush file repeatedly with file card.

\*Do not use sandpaper coarser than 320 grit.

FOLIO REV: ADDWG REV: D

3-Remove sand and plugs

4- scribe batch # and part # as per dwg

130

QC1- Inspect dimensions to dimension sheet

0.00

**\*130\***

QC

Memo

0.00

Quality Control

man 2  
12/08/13man 2  
12/08/13



NCR: Yes / No

## WORK ORDER NON-CONFORMANCE / UPDATE

DQA: JADate: 12/08/12QA Closed: TCDate: 8/18/2012

|  |  |  |  |   |   |  |
|--|--|--|--|---|---|--|
| Work Order: <u>85990</u><br>Part No. <u>D212-604-201TRN</u><br>NCR No. <u>12-1734</u>  | <b>DISPOSITION</b><br>Rework <input type="checkbox"/><br>Scrap <input type="checkbox"/><br>Use-as-is <input checked="" type="checkbox"/><br>Work Order Update <input type="checkbox"/> | <table border="0" style="width:100%;"> <tr> <td style="width:33%;">           Skid-tube <input type="checkbox"/><br/>           Machining <input type="checkbox"/><br/>           Thermoforming <input type="checkbox"/><br/>           Large Fab <input type="checkbox"/> </td> <td style="width:33%;">           Crosstube <input checked="" type="checkbox"/><br/>           Small Fab <input type="checkbox"/><br/>           Finishing <input type="checkbox"/><br/>           Composite <input type="checkbox"/> </td> <td style="width:33%;">           Prod. Eng. Coord. <input type="checkbox"/><br/>           Rec/Store/Packaging <input type="checkbox"/><br/>           Supplier <input type="checkbox"/><br/>           Other <input type="checkbox"/> </td> <td style="width:33%;">           Engineering <input type="checkbox"/><br/>           Quality <input type="checkbox"/><br/> <input type="checkbox"/><br/> <input type="checkbox"/> </td> </tr> </table> | Skid-tube <input type="checkbox"/><br>Machining <input type="checkbox"/><br>Thermoforming <input type="checkbox"/><br>Large Fab <input type="checkbox"/> | Crosstube <input checked="" type="checkbox"/><br>Small Fab <input type="checkbox"/><br>Finishing <input type="checkbox"/><br>Composite <input type="checkbox"/> | Prod. Eng. Coord. <input type="checkbox"/><br>Rec/Store/Packaging <input type="checkbox"/><br>Supplier <input type="checkbox"/><br>Other <input type="checkbox"/> | Engineering <input type="checkbox"/><br>Quality <input type="checkbox"/><br><input type="checkbox"/><br><input type="checkbox"/> |
| Skid-tube <input type="checkbox"/><br>Machining <input type="checkbox"/><br>Thermoforming <input type="checkbox"/><br>Large Fab <input type="checkbox"/> | Crosstube <input checked="" type="checkbox"/><br>Small Fab <input type="checkbox"/><br>Finishing <input type="checkbox"/><br>Composite <input type="checkbox"/>                        | Prod. Eng. Coord. <input type="checkbox"/><br>Rec/Store/Packaging <input type="checkbox"/><br>Supplier <input type="checkbox"/><br>Other <input type="checkbox"/>  | Engineering <input type="checkbox"/><br>Quality <input type="checkbox"/><br><input type="checkbox"/><br><input type="checkbox"/>                         |   |   |  |

| Root Cause  | Date    | Step | Qty | Description of work order update or Non-conformance | Initial Chief Eng | Action Description | Sign & Date   | Verification                  | QC Inspector                  |
|---|---------|------|-----|---|-------------------|--------------------|---------------|-------------------------------|-------------------------------|
| Doc/Data <input type="checkbox"/>                 | 12/8/13 | 100  | 1   | CUFF IS 0.002" under tolerance on O.D.              | CP<br>12/8/13     | Acceptable         | CP<br>12/8/13 | DAS<br>16<br>9-30<br>12/08/13 | DAS<br>16<br>9-30<br>12/08/13 |
| Equip/Tooling <input checked="" type="checkbox"/> |         |      |     |   |                   |                    |               |                               |                               |
| Operator <input type="checkbox"/>                 |         |      |     |   |                   |                    |               |                               |                               |
| Material <input type="checkbox"/>                 |         |      |     |   |                   |                    |               |                               |                               |
| Offset/Setup <input type="checkbox"/>             |         |      |     |   |                   |                    |               |                               |                               |
| Other <input type="checkbox"/>                    |         |      |     |   |                   |                    |               |                               |                               |
| Process <input checked="" type="checkbox"/>       |         |      |     |   |                   |                    |               |                               |                               |
| Supplier <input type="checkbox"/>                 |         |      |     |   |                   |                    |               |                               |                               |
| Training <input type="checkbox"/>                 |         |      |     |   |                   |                    |               |                               |                               |
| Unauthorized <input type="checkbox"/>             |         |      |     |   |                   |                    |               |                               |                               |

## FAULT CATEGORY

|   |  |   |  |   |
|---|--|---|--|---|
| <b>Landing Gear</b><br><input type="checkbox"/> Bending Passes Below Min<br><input type="checkbox"/> Centre Not Concentric to O/S<br><input type="checkbox"/> Cracks<br><input type="checkbox"/> Crushed/Crimp at Bending<br><input type="checkbox"/> Inspection Strip in Tube<br><input type="checkbox"/> Other<br><input type="checkbox"/> Positioned Wrong<br><input type="checkbox"/> Ripples on Inner Bend<br><input checked="" type="checkbox"/> Torque Waves in Extrusion<br><input checked="" type="checkbox"/> Turning Sequence<br><input type="checkbox"/> Wave/Twist in Tube | <b>Hardware</b><br><input type="checkbox"/> Breaking<br><input type="checkbox"/> Missing<br><input type="checkbox"/> Size/Length<br><input type="checkbox"/> Spinning<br><input type="checkbox"/> Threading<br><input type="checkbox"/> Wrong<br><br><b>Drill Holes</b><br><input type="checkbox"/> Misaligned<br><input type="checkbox"/> Ovalized<br><input type="checkbox"/> Over/Undersized<br><input type="checkbox"/> Too Many | <b>General</b><br><input type="checkbox"/> Burrs<br><input type="checkbox"/> Contamination<br><input type="checkbox"/> Cut Too Short<br><input type="checkbox"/> Documentation/Data<br><input type="checkbox"/> Finish<br><input type="checkbox"/> Inspection Incomplete<br><input type="checkbox"/> Inspection Unqualified<br><input type="checkbox"/> Instructions Incomplete/Unclear<br><input type="checkbox"/> Jigs/Fixtures/Tooling<br><input type="checkbox"/> Kit Incorrect<br><input type="checkbox"/> Kit Missing | <input type="checkbox"/> Maintenance<br><input type="checkbox"/> Mislabeled<br><input type="checkbox"/> Off-Set<br><input type="checkbox"/> Orientation Misread<br><input type="checkbox"/> Out of Calibration<br><input type="checkbox"/> Out of Sequence<br><input type="checkbox"/> Outside Dimensions<br><input type="checkbox"/> Over/Under tolerance<br><input type="checkbox"/> Part Lost<br><input type="checkbox"/> Part Moved<br><input type="checkbox"/> Raw Material | <input type="checkbox"/> Set-up<br><input type="checkbox"/> Supplier<br><input type="checkbox"/> Temperature/Cure<br><input type="checkbox"/> Weld<br><input type="checkbox"/> Wrong Stock Pulled<br><input type="checkbox"/> Other<br><br><br><br> |
|---|--|---|--|---|

# Work Order ID 85990

June-19-12 1:17:06 PM

**\*85990\***

Page 3

Item ID: D212-664-201TRN

Accept

**\*N900040100\***

Setup Start **\*NS1\***

Revision ID:

Item Name: Crosstube Turning Detail

Stop **\*NS2\***

Start Date: 19/06/2012 Start Qty: 1.00 **\*1\***

Cust Item ID:

Required Date: 03/07/2012 Req'd Qty: 1.00 **\*1\***

Customer:

Reference:

Approvals: Process Plan: Date:

Tooling: Date:

Run Start **\*NR1\***

QC: Date:

SPC (Y/N): Date:

Stop **\*NR2\***

Sequence ID/  
Work Center ID

Operation  
Description

Set Up/  
Run Hours

Tool ID Tool # Plan Code Accept Qty Reject Qty Reject Number Insp. Stamp

140

QC8- Inspect parts - second check

0.00

**\*140\***

QC

Memo

0.00

Quality Control

*DAC 15 12/05/17*

*JW*

*12-8-13*

145

0.00

**\*145\***

Crosstubes

Memo

0.00

Crosstubes

GRIND ONLY TRANSITION LINES SMOOTH LONGITUDE WAY.

*JW*

*12-8-15*

150

0.00

**\*150\***

HandFXtube

Memo

0.00

Hand Finishing Crosstube

~~Crosstubes Chemical Conversion~~

*JW*  
*RM*

*12-8-19*

1- Pressure wash tube inside and out  
2- Acid Etch x tube inside and out  
Use red scotch brite

NCR: Yes / No

## WORK ORDER NON-CONFORMANCE / UPDATE

DQA: \_\_\_\_\_ Date: \_\_\_\_\_

QA Closed: \_\_\_\_\_ Date: \_\_\_\_\_

|  |   |  |  |  |   |  |
|--|---|--|--|--|---|--|
| Work Order: _____<br><br>Part No. _____<br><br>NCR No. _____   | <b>DISPOSITION</b><br><br>Rework <input type="checkbox"/><br>Scrap <input type="checkbox"/><br>Use-as-is <input type="checkbox"/><br>Work Order Update <input type="checkbox"/> | <b>AGAINST DEPARTMENT/PROCESS</b><br><br><table style="width: 100%; border: none;"> <tr> <td style="width: 33%;">           Skid-tube <input type="checkbox"/><br/>           Machining <input type="checkbox"/><br/>           Thermoforming <input type="checkbox"/><br/>           Large Fab <input type="checkbox"/> </td> <td style="width: 33%;">           Crosstube <input type="checkbox"/><br/>           Small Fab <input type="checkbox"/><br/>           Finishing <input type="checkbox"/><br/>           Composite <input type="checkbox"/> </td> <td style="width: 33%;">           Prod. Eng. Coord. <input type="checkbox"/><br/>           Rec/Store/Packaging <input type="checkbox"/><br/>           Supplier <input type="checkbox"/><br/>           Other <input type="checkbox"/> </td> <td style="width: 33%;">           Engineering <input type="checkbox"/><br/>           Quality <input type="checkbox"/> </td> </tr> </table> | Skid-tube <input type="checkbox"/><br>Machining <input type="checkbox"/><br>Thermoforming <input type="checkbox"/><br>Large Fab <input type="checkbox"/> | Crosstube <input type="checkbox"/><br>Small Fab <input type="checkbox"/><br>Finishing <input type="checkbox"/><br>Composite <input type="checkbox"/> | Prod. Eng. Coord. <input type="checkbox"/><br>Rec/Store/Packaging <input type="checkbox"/><br>Supplier <input type="checkbox"/><br>Other <input type="checkbox"/> | Engineering <input type="checkbox"/><br>Quality <input type="checkbox"/> |
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| Root Cause    | Date | Step | Qty | Description of work order update or Non-conformance | Initial Chief Eng | Action Description | Sign & Date | Verification | QC Inspector |
|---------------|------|------|-----|---|-------------------|--------------------|-------------|--------------|--------------|
| Doc/Data      |      |      |     |   |                   |                    |             |              |              |
| Equip/Tooling |      |      |     |   |                   |                    |             |              |              |
| Operator      |      |      |     |   |                   |                    |             |              |              |
| Material      |      |      |     |   |                   |                    |             |              |              |
| Offset/Setup  |      |      |     |   |                   |                    |             |              |              |
| Other         |      |      |     |   |                   |                    |             |              |              |
| Process       |      |      |     |   |                   |                    |             |              |              |
| Supplier      |      |      |     |   |                   |                    |             |              |              |
| Training      |      |      |     |   |                   |                    |             |              |              |
| Unauthorized  |      |      |     |   |                   |                    |             |              |              |

### FAULT CATEGORY

|   |  |   |  |  |
|---|--|---|--|--|
| <b>Landing Gear</b><br><input type="checkbox"/> Bending Passes Below Min<br><input type="checkbox"/> Centre Not Concentric to O/S<br><input type="checkbox"/> Cracks<br><input type="checkbox"/> Crushed/Crimp at Bending<br><input type="checkbox"/> Inspection Strip in Tube<br><input type="checkbox"/> Other<br><input type="checkbox"/> Positioned Wrong<br><input type="checkbox"/> Ripples on Inner Bend<br><input type="checkbox"/> Torque Waves in Extrusion<br><input type="checkbox"/> Turning Sequence<br><input type="checkbox"/> Wave/Twist in Tube | <b>Hardware</b><br><input type="checkbox"/> Breaking<br><input type="checkbox"/> Missing<br><input type="checkbox"/> Size/Length<br><input type="checkbox"/> Spinning<br><input type="checkbox"/> Threading<br><input type="checkbox"/> Wrong<br><br><b>Drill Holes</b><br><input type="checkbox"/> Misaligned<br><input type="checkbox"/> Ovalized<br><input type="checkbox"/> Over/Undersized<br><input type="checkbox"/> Too Many | <b>General</b><br><input type="checkbox"/> Burrs<br><input type="checkbox"/> Contamination<br><input type="checkbox"/> Cut Too Short<br><input type="checkbox"/> Documentation/Data<br><input type="checkbox"/> Finish<br><input type="checkbox"/> Inspection Incomplete<br><input type="checkbox"/> Inspection Unqualified<br><input type="checkbox"/> Instructions Incomplete/Unclear<br><input type="checkbox"/> Jigs/Fixtures/Tooling<br><input type="checkbox"/> Kit Incorrect<br><input type="checkbox"/> Kit Missing | <input type="checkbox"/> Maintenance<br><input type="checkbox"/> Mislabeled<br><input type="checkbox"/> Off-Set<br><input type="checkbox"/> Orientation Misread<br><input type="checkbox"/> Out of Calibration<br><input type="checkbox"/> Out of Sequence<br><input type="checkbox"/> Outside Dimensions<br><input type="checkbox"/> Over/Under tolerance<br><input type="checkbox"/> Part Lost<br><input type="checkbox"/> Part Moved<br><input type="checkbox"/> Raw Material | <input type="checkbox"/> Set-up<br><input type="checkbox"/> Supplier<br><input type="checkbox"/> Temperature/Cure<br><input type="checkbox"/> Weld<br><input type="checkbox"/> Wrong Stock Pulled<br><br><input type="checkbox"/> Other<br>_____<br>_____<br>_____ |
|---|--|---|--|--|

# Work Order ID 85990

June-19-12 1:17:06 PM

**\*85990\***

Page 4

Item ID: D212-664-201TRN

Accept

**\*N900040100\***

Setup Start

**\*NS1\***

Revision ID:

Item Name: Crosstube Turning Detail

Stop

**\*NS2\***

Start Date: 19/06/2012 Start Qty: 1.00

**\*1\***

Cust Item ID:

Required Date: 03/07/2012 Req'd Qty: 1.00

**\*1\***

Customer:

Reference:

Approvals: Process Plan:

Date:

Tooling:

Date:

Run Start

**\*NR1\***

QC:

Date:

SPC (Y/N):

Date:

Stop

**\*NR2\***

Sequence ID/  
Work Center ID

Operation  
Description

Set Up/  
Run Hours

Tool ID

Tool #

Plan  
Code

Accept  
Qty

Reject  
Qty

Reject  
Number

Insp.  
Stamp

160

**\*160\***

QC

Quality Control

QC5 Inspect Chemical Conversion Coat

0.00

0.00

**DAS 16**  
17/08/20

Memo

170

**\*170\***

Packaging

Packaging

Packaging

Memo

Identify and stock in kanban rack  
Location: 16

0.00

0.00

MO 17/8/20

180

**\*180\***

QC

Quality Control

QC21- Final Inspection - Work Order Release

Memo

0.00

0.00

MLJ 12/08/20  
MLJ 12/08/20



# Picklist Print

June-19-12 1:17:10 PM

Page 1

Work Order ID: 85990

\*85990\*

Parent Item: D212-664-201TRN

\*D212-664-201TRN\*

Parent Item Name: Crosstube Turning Detail

Start Date: 19/06/2012

Required Date: 03/07/2012

Start Qty: 1.00

Required Qty: 1.00

Comments: IPP Rev:A 08-03-06 new issue DD verified by:ec  
IPP Rev B 08.04.02 Removed polish EC verified DD

| Component Item ID/<br>Item Name | Replacement<br>Item ID | Mfg/<br>Purch | Bin<br>Item | Primary<br>Location | Last<br>Location | Route<br>Seq ID | Unit of<br>Measure | Qty on<br>Hand | Qty per Kit | Total<br>Qty | Qty<br>Issued | Date<br>Issued | Status |
|---------------------------------|------------------------|---------------|-------------|---------------------|------------------|-----------------|--------------------|----------------|-------------|--------------|---------------|----------------|--------|
| D6006-129                       |                        | Manufactured  | No          |                     |                  | 120             | Each               | 27.0000        | 1           | 1            |               |                |        |

\*D6006-129\*

\*\*

Crosstube Material

Location

Loc Qty

Loc Code

LG

27

23970

2

26550

3

34690

1

69838

21

1 man. C 12/08/11

NCR: Yes / No

## WORK ORDER NON-CONFORMANCE / UPDATE

DQA: \_\_\_\_\_ Date: \_\_\_\_\_

QA Closed: \_\_\_\_\_ Date: \_\_\_\_\_

|  |   |   |                                      |                                    |  |                                      |                                    |                                    |  |                                  |  |                                    |                                   |  |                                    |                                    |                                |  |
|--|---|---|--------------------------------------|------------------------------------|--|--------------------------------------|------------------------------------|------------------------------------|--|----------------------------------|--|------------------------------------|-----------------------------------|--|------------------------------------|------------------------------------|--------------------------------|--|
| Work Order: _____<br><br>Part No. _____<br><br>NCR No. _____ | <b>DISPOSITION</b><br><br>Rework <input type="checkbox"/><br>Scrap <input type="checkbox"/><br>Use-as-is <input type="checkbox"/><br>Work Order Update <input type="checkbox"/> | <b>AGAINST DEPARTMENT/PROCESS</b><br><br><table style="width: 100%;"> <tr> <td>Skid-tube <input type="checkbox"/></td> <td>Crosstube <input type="checkbox"/></td> <td>Prod. Eng. Coord. <input type="checkbox"/></td> <td>Engineering <input type="checkbox"/></td> </tr> <tr> <td>Machining <input type="checkbox"/></td> <td>Small Fab <input type="checkbox"/></td> <td>Rec/Store/Packaging <input type="checkbox"/></td> <td>Quality <input type="checkbox"/></td> </tr> <tr> <td>Thermoforming <input type="checkbox"/></td> <td>Finishing <input type="checkbox"/></td> <td>Supplier <input type="checkbox"/></td> <td></td> </tr> <tr> <td>Large Fab <input type="checkbox"/></td> <td>Composite <input type="checkbox"/></td> <td>Other <input type="checkbox"/></td> <td></td> </tr> </table> | Skid-tube <input type="checkbox"/>   | Crosstube <input type="checkbox"/> | Prod. Eng. Coord. <input type="checkbox"/> | Engineering <input type="checkbox"/> | Machining <input type="checkbox"/> | Small Fab <input type="checkbox"/> | Rec/Store/Packaging <input type="checkbox"/> | Quality <input type="checkbox"/> | Thermoforming <input type="checkbox"/> | Finishing <input type="checkbox"/> | Supplier <input type="checkbox"/> |  | Large Fab <input type="checkbox"/> | Composite <input type="checkbox"/> | Other <input type="checkbox"/> |  |
| Skid-tube <input type="checkbox"/>                           | Crosstube <input type="checkbox"/>  | Prod. Eng. Coord. <input type="checkbox"/>  | Engineering <input type="checkbox"/> |                                    |  |                                      |                                    |                                    |  |                                  |  |                                    |                                   |  |                                    |                                    |                                |  |
| Machining <input type="checkbox"/>                           | Small Fab <input type="checkbox"/>  | Rec/Store/Packaging <input type="checkbox"/>  | Quality <input type="checkbox"/>     |                                    |  |                                      |                                    |                                    |  |                                  |  |                                    |                                   |  |                                    |                                    |                                |  |
| Thermoforming <input type="checkbox"/>                       | Finishing <input type="checkbox"/>  | Supplier <input type="checkbox"/>   |                                      |                                    |  |                                      |                                    |                                    |  |                                  |  |                                    |                                   |  |                                    |                                    |                                |  |
| Large Fab <input type="checkbox"/>                           | Composite <input type="checkbox"/>  | Other <input type="checkbox"/>  |                                      |                                    |  |                                      |                                    |                                    |  |                                  |  |                                    |                                   |  |                                    |                                    |                                |  |

| Root Cause                             | Date | Step | Qty | Description of work order update or Non-conformance | Initial Chief Eng | Action Description | Sign & Date | Verification | QC Inspector |
|--|------|------|-----|---|-------------------|--------------------|-------------|--------------|--------------|
| Doc/Data <input type="checkbox"/>      |      |      |     |   |                   |                    |             |              |              |
| Equip/Tooling <input type="checkbox"/> |      |      |     |   |                   |                    |             |              |              |
| Operator <input type="checkbox"/>      |      |      |     |   |                   |                    |             |              |              |
| Material <input type="checkbox"/>      |      |      |     |   |                   |                    |             |              |              |
| Offset/Setup <input type="checkbox"/>  |      |      |     |   |                   |                    |             |              |              |
| Other <input type="checkbox"/>         |      |      |     |   |                   |                    |             |              |              |
| Process <input type="checkbox"/>       |      |      |     |   |                   |                    |             |              |              |
| Supplier <input type="checkbox"/>      |      |      |     |   |                   |                    |             |              |              |
| Training <input type="checkbox"/>      |      |      |     |   |                   |                    |             |              |              |
| Unauthorized <input type="checkbox"/>  |      |      |     |   |                   |                    |             |              |              |

### FAULT CATEGORY

|   |  |   |
|---|--|---|
| <b>Landing Gear</b><br><input type="checkbox"/> Bending Passes Below Min<br><input type="checkbox"/> Centre Not Concentric to O/S<br><input type="checkbox"/> Cracks<br><input type="checkbox"/> Crushed/Crimp at Bending<br><input type="checkbox"/> Inspection Strip in Tube<br><input type="checkbox"/> Other<br><input type="checkbox"/> Positioned Wrong<br><input type="checkbox"/> Ripples on Inner Bend<br><input type="checkbox"/> Torque Waves in Extrusion<br><input type="checkbox"/> Turning Sequence<br><input type="checkbox"/> Wave/Twist in Tube | <b>Hardware</b><br><input type="checkbox"/> Breaking<br><input type="checkbox"/> Missing<br><input type="checkbox"/> Size/Length<br><input type="checkbox"/> Spinning<br><input type="checkbox"/> Threading<br><input type="checkbox"/> Wrong<br><br><b>Drill Holes</b><br><input type="checkbox"/> Misaligned<br><input type="checkbox"/> Ovalized<br><input type="checkbox"/> Over/Undersized<br><input type="checkbox"/> Too Many | <b>General</b><br><input type="checkbox"/> Burrs<br><input type="checkbox"/> Contamination<br><input type="checkbox"/> Cut Too Short<br><input type="checkbox"/> Documentation/Data<br><input type="checkbox"/> Finish<br><input type="checkbox"/> Inspection Incomplete<br><input type="checkbox"/> Inspection Unqualified<br><input type="checkbox"/> Instructions Incomplete/Unclear<br><input type="checkbox"/> Jigs/Fixtures/Tooling<br><input type="checkbox"/> Kit Incorrect<br><input type="checkbox"/> Kit Missing<br><br><input type="checkbox"/> Maintenance<br><input type="checkbox"/> Mislabeled<br><input type="checkbox"/> Off-Set<br><input type="checkbox"/> Orientation Misread<br><input type="checkbox"/> Out of Calibration<br><input type="checkbox"/> Out of Sequence<br><input type="checkbox"/> Outside Dimensions<br><input type="checkbox"/> Over/Under tolerance<br><input type="checkbox"/> Part Lost<br><input type="checkbox"/> Part Moved<br><input type="checkbox"/> Raw Material |
|---|--|---|

|   |                     |              |
|---|---------------------|--------------|
| <b>DART AEROSPACE LTD</b>                                 | <b>Work Order:</b>  | 85990        |
| <b>Description:</b> Crosstube Assembly (205/212 High Aft) | <b>Part Number:</b> | D212-664-241 |
| <b>Inspection Dwg:</b> D212-664-241 Rev: D                |                     | Page 1 of 2  |

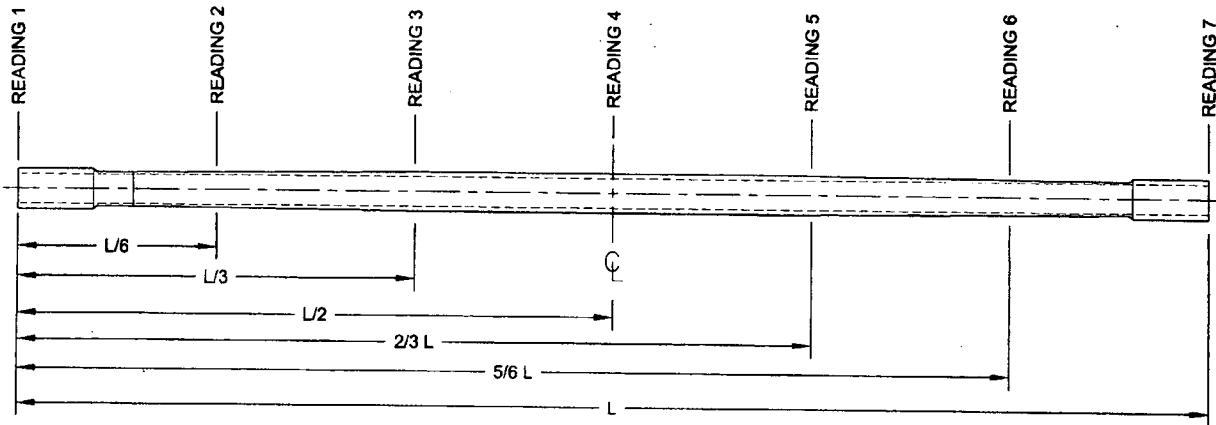
### FIRST ARTICLE INSPECTION CHECKLIST

| Inspection Sheet<br>Drawing Dimension | Tolerance | Actual<br>Dimension | Accept  | Reject | Method of<br>Inspection | Comments |
|---------------------------------------|-----------|---------------------|---------|--------|-------------------------|----------|
| SIDE A                                | 0.200     | +/-0.010            | 200     | /      | vern                    | CNC-08   |
|                                       | R0.063    | +/-0.010            | 0.063   | /      | R6                      |          |
|                                       | 2.990     | +0.005/-0.000       | 2.991   | /      | vern                    | CNC-08   |
|                                       | 5.237     | +/-0.030            | 5.237   | /      |                         |          |
|                                       | 2.600     | +0.005/-0.000       | 2.604   | /      |                         |          |
|                                       | 2.686     | +0.005/-0.000       | 2.696   | /      |                         |          |
|                                       | 2.770     | +0.005/-0.000       | 2.775   | /      |                         |          |
|                                       | 2.854     | +0.005/-0.000       | 2.858   | /      |                         |          |
|                                       | 2.938     | +0.005/-0.000       | 2.940   | /      |                         |          |
|                                       | 3.021     | +0.005/-0.000       | 3.026   | /      |                         |          |
|                                       | 3.133     | +0.005/-0.000       | 3.138   | /      |                         |          |
|                                       | 3.179     | +0.005/-0.000       | 3.182   | /      |                         |          |
|                                       |           |                     |         |        |                         |          |
|                                       |           |                     |         |        |                         |          |
| SIDE B                                | 0.200     | +/-0.010            | 200     | /      | vern                    | CNC-08   |
|                                       | R0.063    | +/-0.010            | 0.063   | /      | R6                      |          |
|                                       | 2.990     | +0.005/-0.000       | 2.990   | /      | vern                    | CNC-08   |
|                                       | 5.237     | +/-0.030            | 5.237   | /      |                         |          |
|                                       | 2.600     | +0.005/-0.000       | 2.604   | /      |                         |          |
|                                       | 2.686     | +0.005/-0.000       | 2.690   | /      |                         |          |
|                                       | 2.770     | +0.005/-0.000       | 2.775   | /      |                         |          |
|                                       | 2.854     | +0.005/-0.000       | 2.857   | /      |                         |          |
|                                       | 2.938     | +0.005/-0.000       | 2.940   | /      |                         |          |
|                                       | 3.021     | +0.005/-0.000       | 3.026   | /      |                         |          |
|                                       | 3.133     | +0.005/-0.000       | 3.138   | /      |                         |          |
|                                       | 3.179     | +0.005/-0.000       | 3.182   | /      |                         |          |
|                                       | 124.362   | +/-0.020            | 124.360 | /      | tape                    | LG-22    |
|                                       |           |                     |         |        |                         |          |
|                                       |           |                     |         |        |                         |          |



|   |                                  |
|---|----------------------------------|
| <b>DART AEROSPACE LTD</b>                                 | <b>Work Order:</b> 85990         |
| <b>Description:</b> Crosstube Assembly (205/212 High Aft) | <b>Part Number:</b> D212-664-241 |
| <b>Inspection Dwg:</b> D212-664-241 Rev: D                | <b>Page 2 of 2</b>               |

### WALL THICKNESS MEASUREMENT



| Location             | WALL THICKNESS MEASUREMENT (IN) |      |      |      | Deviation<br>$\Delta w$<br>(max-min) | TOLERANCE |
|----------------------|---------------------------------|------|------|------|--------------------------------------|-----------|
|                      | w1                              | w2   | w3   | w4   |                                      |           |
| READING 1<br>L= 0"   | .389                            | .395 | .384 | .378 | .017                                 | 0.062"    |
| READING 2<br>L= 15   | .274                            | .279 | .249 | .248 | .031                                 |           |
| READING 3<br>L= 30   | .387                            | .396 | .379 | .373 | .023                                 |           |
| READING 4<br>L= 62   | .516                            | .523 | .524 | .515 | .009                                 |           |
| READING 5<br>L= 30   | .381                            | .397 | .382 | .377 | .020                                 |           |
| READING 6<br>L= 15   | .259                            | .270 | .265 | .255 | .015                                 |           |
| READING 7<br>L= cuff | .387                            | .385 | .382 | .388 | .006                                 |           |

#### Calibration Result

Actual Block Thickness: 250-750

Sitiescan 250 Measured Thickness: 250-750

|                                  |                              |                              |
|----------------------------------|------------------------------|------------------------------|
| <b>Measured by:</b> <u>MAM.L</u> | <b>Audited by:</b> <u>JW</u> | <b>Preliminary Approval:</b> |
| <b>Date:</b> <u>12/08/13</u>     | <b>Date:</b> <u>12-8-13</u>  | <b>Date:</b>                 |

| Rev | Date     | Change                           | Revised by | Approved |
|-----|----------|----------------------------------|------------|----------|
| A   | 05.04.27 | New Issue (P/O D412-664-201)     | KJ/JLM     |          |
| B   | 06.03.09 | Tolerance for 5.237 was +/-0.001 | KJ/JLM     |          |
| C   | 07.05.08 | Dwg Rev. updated                 | KJ/JLM     |          |
| D   | 10.08.03 | Dimension 124.362 was 124.36     | KJ         |          |
| E   | 12.06.04 | Wall thickness form added        | KJ         |          |

| Item | Qty<br>-241 | Qty<br>-241B | Part Number    | Description   |
|------|-------------|--------------|----------------|---|
| 1    | X           |              | D212-664-241   | CROSSTUBE ASSEMBLY (205/212 HIGH AFT)   |
| 2    |             | X            | D212-664-241B  | CROSSTUBE ASSEMBLY (214 HIGH AFT)   |
| 3    | 1           | 1            | D6006-129      | CROSSTUBE   |
| 4    | 2           | 2            | D2940-1        | SUPPORT   |
| 5    | 4           | 4            | D3595-063-530  | RUBBER CUSHION  |
| 6    | 4           | 4            | MS21920-28     | CLAMP (OR MS21920-30)   |
| 7    | A/R         | A/R          | MAGNOBOND 6398 | ROCKWELL SPECIFICATION RBO-120-023<br>ADHESIVE (TEXTRON/BELL SPEC. 299-947-100,<br>TYPE II, CLASS 2 ADHESIVE) |

# GENERAL NOTES:

- 1) MATERIAL: MANUFACTURED FROM D6006-129  
FINISHED LENGTH = 124.362±0.020
- 2) FINISH: CHEMICAL CONVERSION COAT PER DART QSI 005 4.1  
PRIME INSIDE AND OUTSIDE PER DART QSI 005 4.2  
PAINT OUTSIDE PER DART QSI 005 4.2
- 3) TOLERANCES ARE PER DART QSI 018 UNLESS OTHERWISE NOTED.
- 4) UNITS: INCHES UNLESS OTHERWISE NOTED.
- 5) BREAK SHARP EDGES: 0.005 TO 0.010 MAX.
- 6) IDENTIFICATION: SCRIBE DART PART NUMBER "D212-664-XXX" AND BATCH NUMBER ON INSIDE OF CUFF USING VIBRATING STYLUS.
- 7) WEIGHT: D212-664-241 = 44.2 lbs (PER IIN-D212-664)  
D212-664-241B = 44.2 lbs (PER IIN-D212-664)
- 8) PART IS SYMMETRIC ABOUT CENTERLINE.
- 9) RUN CUTTER OFF PART. BLEND OUT EDGE LONGITUDINALLY, TRANSITION SHOULD BE SMOOTH.
- 10) BEND PROGRESSIVELY WITH A MINIMUM OF 5 PASSES. MAXIMUM TUBE FLATTENING DUE TO BENDING IS 6% BASED ON O.D.
- 11) LIQUID PENETRANT INSPECT OUTSIDE SURFACE OF CROSSTUBE PER QSI 038.
- 12) INSTALL D2940-1 SUPPORT USING 0.03" TO 0.06" THICK LAYER OF MAGNOBOND 6398 TO THE SURFACE OF D2940-1 THAT WILL BE IN CONTACT WITH THE CROSSTUBE PER QSI 015. LET CURE FOR 12 HOURS AFTER INSTALLATION AND PRIOR TO PACKAGING.
- 13) INSTALL MS21920-28 CLAMPS (OR -30) WITH D3595-063-530 RUBBER CUSHIONS TO SECURE THE D2940-1 SUPPORT ON TOP SIDE OF THE CROSSTUBE. ENSURE CLAMPS ARE OPPOSITE OF CROSSTUBE SUPPORT.
- 14) EXTREME CARE MUST BE TAKEN TO PROTECT THE OUTSIDE SURFACE OF THE TUBE. THE OUTSIDE SURFACE MUST BE SMOOTH AND FREE FROM SURFACE DEFECTS SUCH AS SCRATCHES, NICKS, OR DENTS. DEFECTS UP TO 0.005" MAY BE BLENDED OUT LONGITUDINALLY. CIRCUMFERENTIAL GRIND MARKS ARE UNACCEPTABLE.
- 15) TORQUE CLAMPS 80 TO 100 IN-LB. ENSURE AT LEAST 1.5 THREADS SHOWING IN SAFETY AND THAT NUT HAS NOT BOTTOMED-OUT AFTER TORQUING.

SHOP COPY  
RETURN TO  
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UNCONTROLLED COPY  
SUBJECT TO AMENDMENT  
WITHOUT NOTICE

WORK ORDER  
NO. 85990 MCT  
12/06/19

600 #11-614  
11.08.25

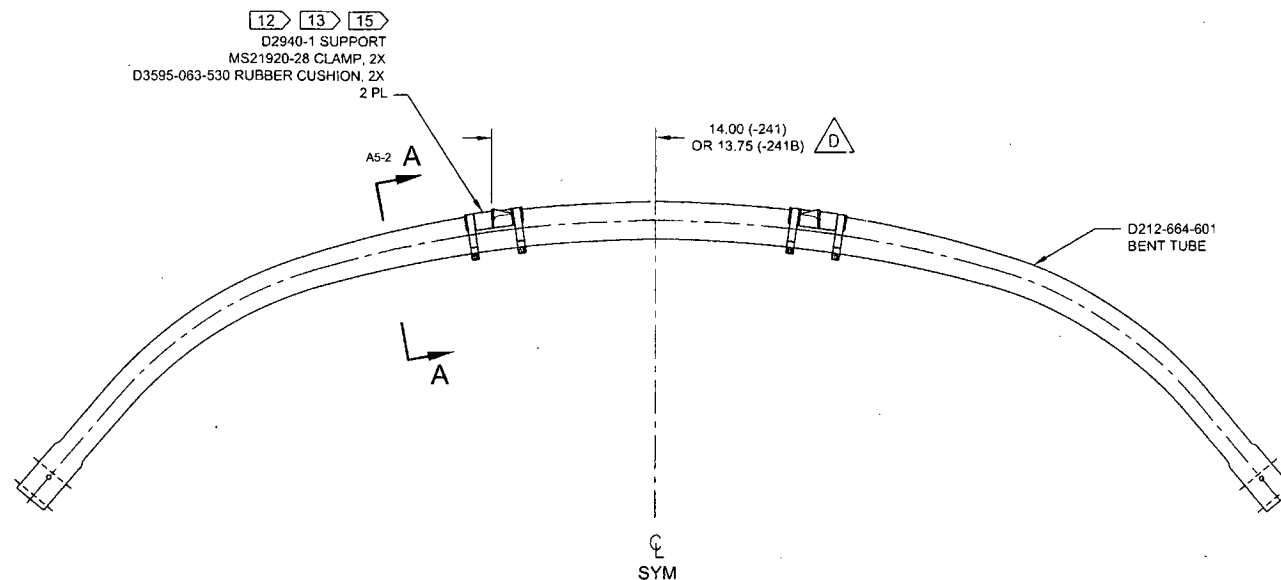
UNDER REVIEW

DEO ATTACHED

RELEASED  
2009-10-29

|            |  |   |              |
|------------|--|---|--------------|
| D          | REFORMAT/REVISE GENERAL NOTES/PART LIST; REORGANIZED VIEWS AND REFORMATTED DRAWING TO CURRENT STANDARDS; ADD -241B (ZN D4-2, B4-2); REMOVED REF & ADD TOLERANCES (ZN D8-3 & C4-3, C6-3 & A8-3); RELOCATED FLAG #6 PER PART 08-048 (ZN A5-3); MOVED TURNING DETAIL & UPDATED TOLERANCE TO SHEET 4 | RF  | 09.09.30     |
| C          | REMOVE -1009 ABRASION STRIP; ADD MAGNOBOND 6398, CUSHION, REVERSE CLAMPS   | PH  | 07.03.08     |
| B          | ADD HOLES FOR COMPATABILITY WITH BHT/AA SKIDTUBES  | PH  | 05.02.04     |
| A          | NEW ISSUE  | PH  | 00.12.12     |
| REV.       | DESCRIPTION  | BY  | DATE         |
| DESIGN     | PH   | DART AEROSPACE LTD  |              |
| DRAWN      | RF   | HAWKESBURY, ONTARIO, CANADA   |              |
| CHECKED    | PH   | DRAWING NO.   | REV. D       |
| MFG. APPR. | PH   | D212-664-241  | SHEET 1 OF 4 |
| APPROVED   | PH   | TITLE   | SCALE        |
| DE APPR.   | PH   | CROSSTUBE ASSY (205/212 HI AFT)   | NTS          |
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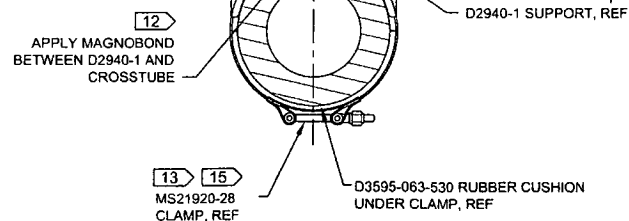


**D212-664-241/-241B  
ASSEMBLY DETAIL**

OCN #11-614  
11.07.26  
**UNDER REVIEW**  
11.06.13

**DEO ATTACHED**

**RELEASED**  
2009-10-28



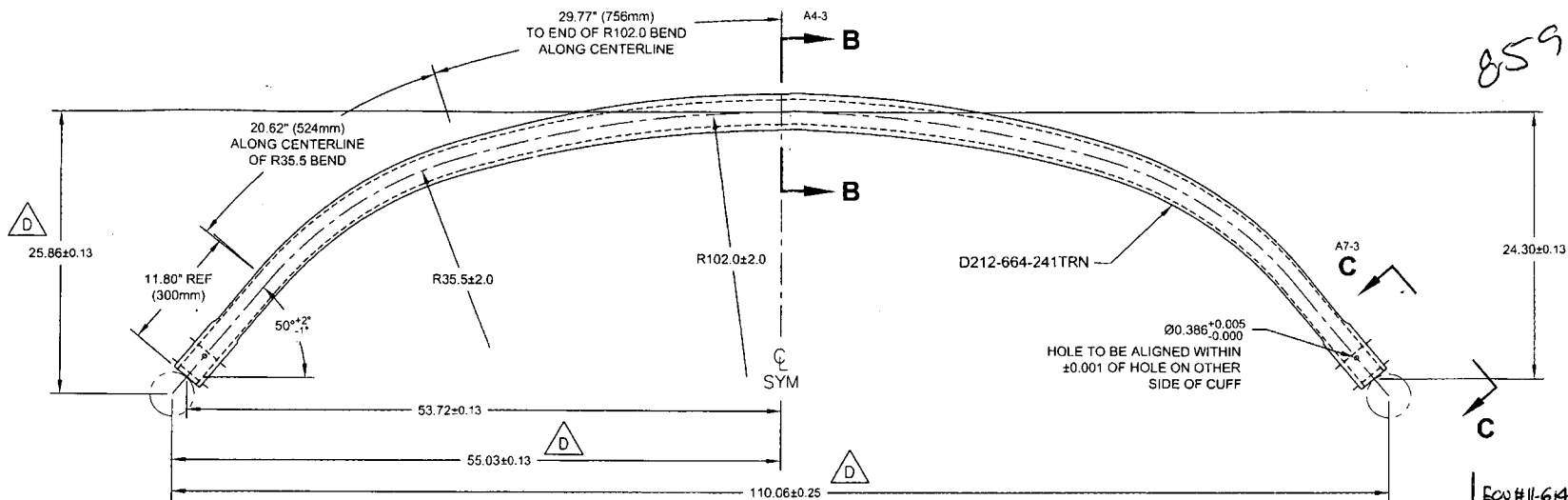
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SCALE 4X

|  |          |  |              |
|--|----------|--|--------------|
| DESIGN   | PH       | <b>DART AEROSPACE LTD</b>              |              |
| DRAWN  | RF       | HAWKESBURY, ONTARIO, CANADA            |              |
| CHECKED  | 92       | DRAWING NO.                            | REV. D       |
| MFG. APPR.   | SS       | D212-664-241                           | SHEET 2 OF 4 |
| APPROVED   | AP       | TITLE                                  | SCALE        |
| DE APPR.   | H        | CROSSTUBE ASS'Y (205/212 HI AFT)       | NTS          |
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85990



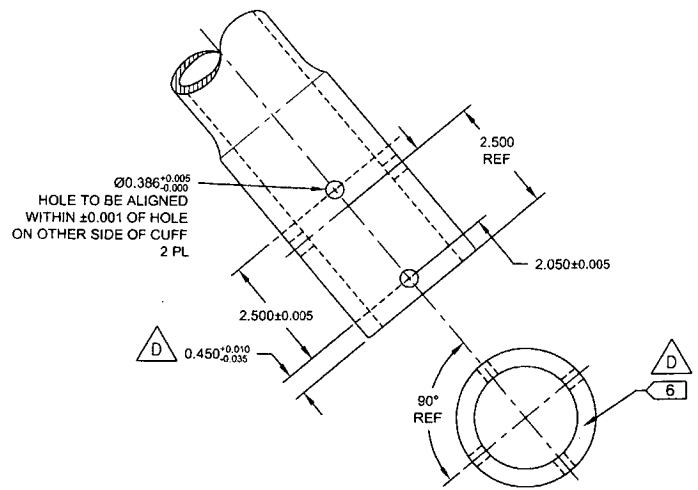
**D212-664-601** 10 D  
**BENDING AND DRILLING DETAIL**

EOU #11-614  
 11.07.26

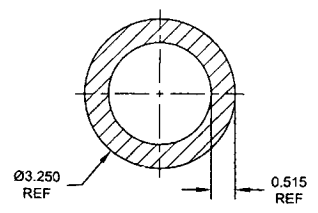
**UNDER REVIEW**  
9/11/26.13

**DEO ATTACHED**

**RELEASED**  
 2009-10-29



**VIEW C-C: CUFF DETAIL** D2-3  
 SCALE 3X



**SECTION B-B** D4-3  
 SCALE 4X

|            |           |   |              |
|------------|-----------|---|--------------|
| DESIGN     | <i>PH</i> | <b>DART AEROSPACE LTD</b>   |              |
| DRAWN      | <i>RF</i> | HAWKESBURY, ONTARIO, CANADA   |              |
| CHECKED    | <i>PS</i> | DRAWING NO.   | REV. D       |
| MFG. APPR. | <i>PS</i> | D212-664-241  | SHEET 3 OF 4 |
| APPROVED   | <i>PH</i> | TITLE   | SCALE        |
| DE APPR.   | <i>PH</i> | CROSSTUBE ASS'Y (205/212 HI AFT)  | NTS          |
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8 7 6 5 4 3 2 1

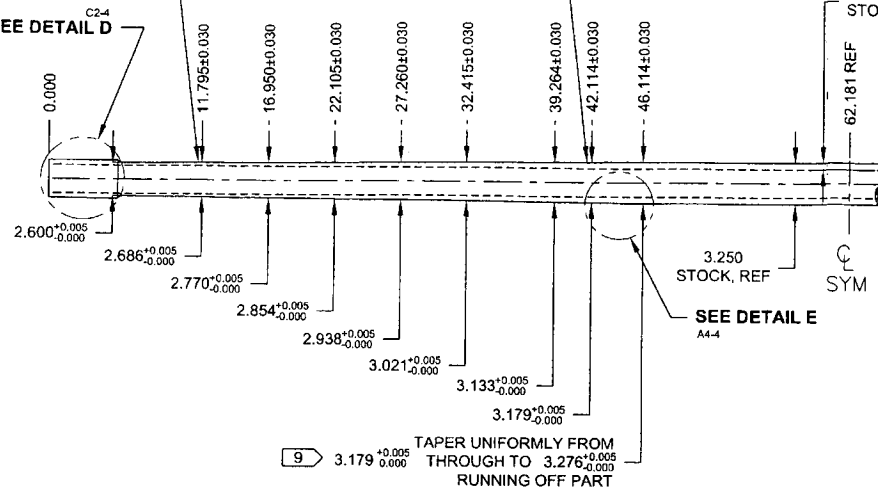


R100.0 TRANSITION  
BETWEEN TAPERED  
SECTIONS

R100.0 TRANSITION  
BETWEEN TAPERED  
SECTIONS

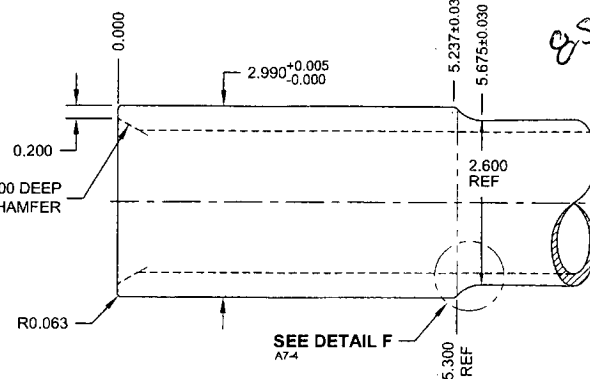
0.515 WALL  
STOCK, REF

SEE DETAIL D



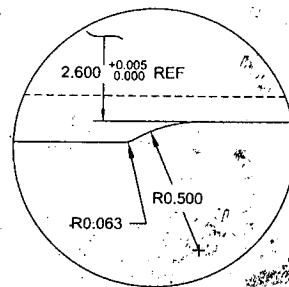
SEE DETAIL E  
A4-4

9  
30° X 0.500 DEEP  
CHAMFER

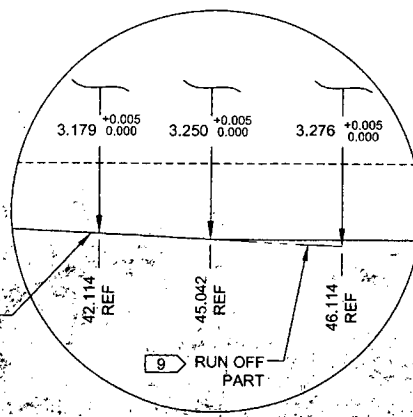


DETAIL D:  
CROSSTUBE CUFF D8-4  
SCALE 5X

D  
D212-664-241TRN  
TURNING DETAIL



DETAIL F:  
CUFF TRANSITION  
SCALE 10X



DETAIL E:  
TAPER RUN-OFF  
SCALE 10X

85990  
D212-614  
11.07.28  
UNDER REVIEW  
9/1/08

DEO ATTACHED  
RELEASED  
2009-10-29

|           |          |                                 |              |
|-----------|----------|---------------------------------|--------------|
| DESIGN    | PH       | DART AEROSPACE LTD              |              |
| DRAWN     | RF       | HAWKESBURY, ONTARIO, CANADA     |              |
| CHECKED   | Q        | DRAWING NO.                     | REV. D       |
| MFG. APPR | 10       | D212-664-241                    | SHEET 4 OF 4 |
| APPROVED  | 10       | TITLE                           | SCALE        |
| DATE      | 09.09.30 | CROSSTUBE ASSY (205/212 HI AFT) | NTS          |

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|                             |  |               |   |               |                                |                           |              |
|-----------------------------|--|---------------|---|---------------|--------------------------------|---------------------------|--------------|
| DRAWING NO.<br>D212-664-241 | TITLE<br>CROSSTUBE ASSY (205/212 HI AFT) | REV. D        | DART AEROSPACE LTD<br>ENGINEERING ORDER |               | D.E.O. NO.<br>D212-664-241-D-1 | SHEET NO.<br>SHEET 1 OF 2 | SCALE<br>NTS |
| DRAWN                       | CHECKED                                  | MFG. APPR.    | APPROVED                                | DE APPR.      |                                |                           |              |
| DATE 11.04.07               | DATE 11.04.11                            | DATE 11.04.12 | DATE 11/04/12                           | DATE 11.04.12 |                                |                           |              |

**PURPOSE:**

ADD AN INSPECTION WINDOW TO UNDERSIDE OF CROSSTUBE.

**CHANGE:**

NOTES 2 OF SHEET 1 IS AMENDED AS FOLLOWS:

**IS:**

- 2) FINISH: CHEMICAL CONVERSION COAT PER DART QSI 005 4.1  
PRIME INSIDE AND OUTSIDE PER DART QSI 005 4.2  
MASK UNDERSIDE OF CROSSTUBE AS SHOWN (HATCHED AREA) AND  
PAINT OUTSIDE PER DART QSI 005 4.2  
REMOVE MASKING AND APPLY CLEAR COAT

**WAS:**

- 2) FINISH: CHEMICAL CONVERSION COAT PER DART QSI 005 4.1  
PRIME INSIDE AND OUTSIDE PER DART QSI 005 4.2  
PAINT OUTSIDE PER DART QSI 005 4.2

RELEASED  
2011-04-18

UNDER REVIEW

11.16.13

ECN#1-614

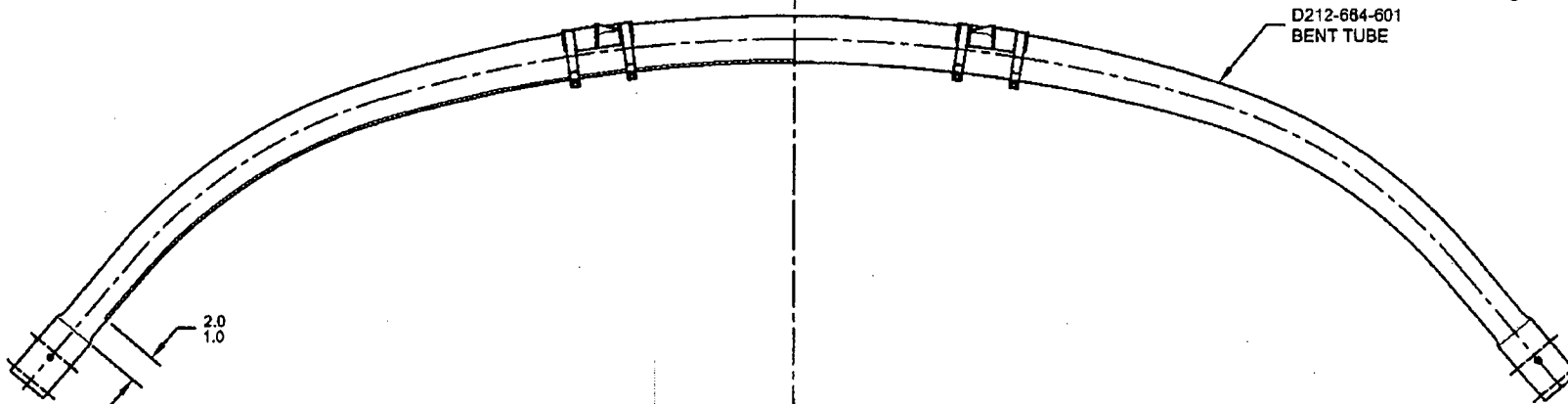
11.07.20

85990

|                             |  |                     |   |  |                                |                           |              |
|-----------------------------|--|---------------------|---|--|--------------------------------|---------------------------|--------------|
| DRAWING NO.<br>D212-664-241 | TITLE<br>CROSSTUBE ASSY (205/212 HI AFT) | REV. D              | DART AEROSPACE LTD<br>ENGINEERING ORDER |  | D.E.O. NO.<br>D212-664-241-D-1 | SHEET NO.<br>SHEET 2 OF 2 | SCALE<br>NTS |
| DRAWN                       | CHECKED <i>GP</i>                        | MFG. APPR. <i>E</i> | APPROVED <i>MD</i>                      |  | DE APPR. <i>MD</i>             |                           |              |
| DATE 11.04.07               | DATE 11.04.11                            | DATE 11.04.12       | DATE 11/04/12                           |  | DATE 11.04.12                  |                           |              |

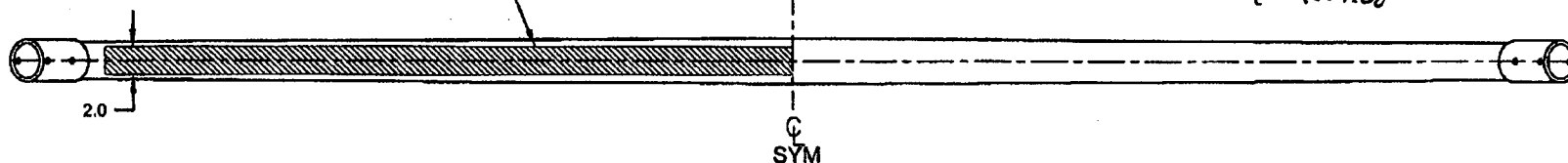
**IS:**

**WAS:**



**D212-664-241-241B  
ASSEMBLY DETAIL**

MASK AREA PRIOR TO PAINTING,  
REMOVE MASKING AFTER PAINT  
AND APPLY CLEAR COAT



**RELEASED**  
2011-04-18

**UNDER REVIEW**

*GP* 11.06.13  
00011.64  
11.07.28



|                             |   |                     |   |                                |                           |              |
|-----------------------------|---|---------------------|---|--------------------------------|---------------------------|--------------|
| DRAWING NO.<br>D212-664-241 | TITLE<br>CROSSTUBE ASS'Y (205/212 HI AFT) | REV. D              | <b>DART AEROSPACE LTD<br/>ENGINEERING ORDER</b> | D.E.O. NO.<br>D212-664-241-D-2 | SHEET NO.<br>SHEET 1 OF 1 | SCALE<br>NTS |
| DRAWN <i>q</i>              | CHECKED <i>ASS</i>                        | MFG. APPR. <i>8</i> | APPROVED <i>MD</i>                              | DE APPR. <i>4</i>              |                           |              |
| DATE 11.07.15               | DATE 11.07.20                             | DATE 11.07.21       | DATE 11/27/21                                   | DATE 11.07.21                  |                           |              |

**PURPOSE:**

REPLACE MAGNOBOND WITH PROSEAL.

**CHANGE:**

IS:

| Item | Qty<br>-241 | Qty<br>-241B | Part Number     | Description                   |
|------|-------------|--------------|-----------------|-------------------------------|
| 7    | A/R         | A/R          | PROSEAL 890 B-2 | SEALANT, AMS-S-8802 CLASS B-2 |

WAS:

|   |     |     |                |   |
|---|-----|-----|----------------|---|
| 7 | A/R | A/R | MAGNOBOND 6398 | ROCKWELL SPECIFICATION RBO-120-023<br>ADHESIVE (TEXTRON/BELL SPEC. 299-947-100,<br>TYPE II, CLASS 2 ADHESIVE) |
|---|-----|-----|----------------|---|

NOTE 12 & 15, SHEET 1 IS AMENDED AS FOLLOWS:

IS:

- 12) TO INSTALL D2940-1 SUPPORT: ABRASE MATING SURFACE OF SUPPORT AND CROSSTUBE WITH 180-GRIT SANDPAPER AND REMOVE RESIDUE WITH MEK (OR EQUIVALENT). APPLY A 0.04" TO 0.07" THICK LAYER OF PROSEAL 890 CLASS B-2 (OR AMS-S-8802 CLASS B-2) SEALANT TO MATING SURFACE OF SUPPORT.
- 15) TORQUE CLAMPS 80 TO 100 IN-LB. ENSURE AT LEAST 1.5 THREADS SHOWING IN SAFETY AND THAT NUT HAS NOT BOTTOMED-OUT AFTER TORQUING. **PRIOR TO PACKAGING, RE-CHECK TORQUE ON CLAMPS AFTER PROSEAL 890 SEALANT HAS CURED FOR 72 HOURS.**

WAS:

- 12) INSTALL D2940-1 SUPPORT USING 0.03" TO 0.06" THICK LAYER OF MAGNOBOND 6398 TO THE SURFACE OF D2940-1 THAT WILL BE IN CONTACT WITH THE CROSSTUBE PER QSI 015. LET CURE FOR 12 HOURS AFTER INSTALLATION AND PRIOR TO PACKAGING.
- 15) TORQUE CLAMPS 80 TO 100 IN-LB. ENSURE AT LEAST 1.5 THREADS SHOWING IN SAFETY AND THAT NUT HAS NOT BOTTOMED-OUT AFTER TORQUING.

**RELEASED**  
2011-07-28  
*W*



